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Near infrared spectroscopic assessment of lipid core plaque changes after coronary artery stenting

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Background: Intravascular near-infrared spectroscopy (NIRS) has been validated for assessment of confluent lipid core plaque (LCP) while virtual histology intravascular ultrasound (VH-IVUS) classifies plaque as necrotic core (NC), fibrofatty, fibrotic, or dense calcium.
Methods: We performed both NIRS and VH-IVUS pre- and post-intervention in a cohort of 30 pts to evaluate LCP changes after coronary artery stenting. Based on the NIRS block chemogram(a metric of the probability of LCP in a 2mm-long NIRS chemogram segment),we excluded 5 lesions without any LCP (no yellow blocks,the highest probability of LCP). We divided the other 25 pts into 2 groups: A – lesions with a ≥2 block reduction in the number of yellow or tan blocks (2 highest probabilities of LCP, n=17) in the post-stent block chemogram and B – lesions with little or no change post-stenting (n=8).VH-IVUS assessment of the worst 10mm-long lumen-compromised segment included quantitative measures of the 4 plaque components and the presence of a VH thin cap or thick-cap fibroatheroma(TCFA or ThCFA)
Results: 51% of pts presented with acute coronary syndrome. The average stent size (2.9±0.3mm) and total stent length (22.3±6.6mm) were comparable between the 2 groups. Pre-intervention lipid core burden index (LCBI) was similar in both groups, but was significantly reduced post-stenting in Group A.Pre-intervention VH-IVUS showed that Group A had a smaller minimum lumen area(MLA) with a greater plaque burden at the MLA site, and a trend toward longer VH-TCFA, but shorter ThCFA (Table).

	Group A (n=17)	Group B (n=8)	P Value
Minimum lumen area, mm2	2.7±0.8	3.4±0.6	0.03
Plaque burden at MLA site, %	82.9±4.6	76.7±10.4	0.047
Volumetric plaque burden, %	67.1±13.4	65.2±12.9	0.74
Volumetric necrotic core, %	26.0±7.7	21.8±10.7	0.26
Maximum NC angle, °	237±105	185±101	0.25
VH-TCFA, %	70.6% (12/17)	50% (4/8)	0.39
Total VH-TCFA length, mm	4.9±4.0	2.0±2.4	0.075
ThCFA, %	17.6% (3/17)	37.5% (3/8)	0.34
Total ThCFA length, mm	2.7±2.7	5.0±3.4	0.090
NIRS pre-stent LCBI	108±50	108±48	0.98
NIRS post-stent LCBI	48±36	98±40	0.005
NIRS ΔLCBI	61±23 (-61±23)	10±33 (-10±33)	0.0002

Conclusion: more than half (56.6%) of lesions have a decrease in LCP (NIRS) after coronary stent implantation. The presence of a longer superficial NC (VH-TCFA) predicted the plaques that would have a reduced lipid core after stenting

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Acute effects of nicardipine and esmolol on the cardiac cycle, hemodynamic and endothelial shear stress in patients with unstable angina pectoris and moderate coronary stenosis: results from single center, randomized study

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Background: Nicardipine and esmolol exhibit cardioprotection via different mechanisms. However, their acute effects on hemodynamic and ESS are still unknown.
Methods: 116 patients with unstable angina and moderate coronary stenosis were randomly divided into nicardipine (n=59) and esmolol (n=57) groups. Both drugs were injected as a bolus followed by continuous infusion to achieve the steady states defined as the mean blood pressure (MBP) reduced by ≥10% or a heart-rate change by ≥15 bpm, lasting for at least 10 min. The aortic pressure (AP), EKG, blood velocity, right atrial pressure, distal coronary pressure (DCP), systolic time (ST), isovolumetric diastolic time (IVDT), speed filling time (SFT) and endothelial shear stress (ESS) were simultaneously calculated at baseline and steady states.
Results: Both drugs significantly reduced blood pressure and rate-pressure load. Nicardipine was associated with negative remodeling of the distal segment. Esmolol increased minimal lumen diameter (p=0.040), prolonged SFT (0.34±0.03 s vs. 0.41±0.03 s, p<0.001), reduced DCP (p<0.001) and increased blood velocity (33.65±1.07 cm/s vs. 43.36±1.25 cm/s, p<0.001) at SFT stages, with increased blood-flow (p<0.001). Both drugs increased downstream ESS. Esmolol significantly reversed abnormally increased ESS (p<0.001) and increased upstream ESS compared with nicardipine (p<0.001).
Conclusion: Beyond a similar reduction of AP, patients with UA and MCS could benefit more from the reduction of heart rate induced by esmolol, rather than nicardipine (ChiCTR-TRC-10000964).

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New Insights Into The Coronary Artery Bifurcation: Hypothesis Generating Concepts Utilising 3-Dimensional Optical Frequency Domain Imaging

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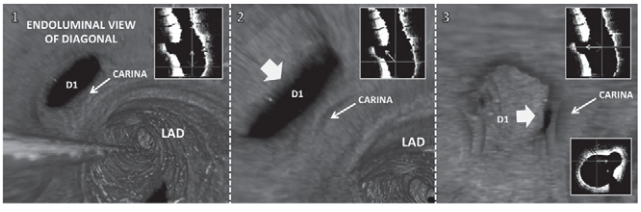
Background: Coronary artery bifurcations are a common challenging lesion subset approximating to 10-20% of all PCI. Provisional T-stenting (Prov-T) is generally recommended as the first line management of most lesions. Carina shift is the predominant mechanism of side-branch (SideB) pinching during Prov-T & has been indirectly inferred from benchwork & 2D intravascular imaging modalities.
Methods: Offline 3D reconstructions of coronary bifurcations & the effects of Prov-T from patients in the FIM trial of the high-frequency (160 fr/s) Terumo OFDI system were undertaken. 3D QCA were performed to assess the bifurcation angulation.
Results: Through a series of 3D reconstructions several novel hypothesis-generating concepts are presented. The principles of "perpendicular" & "parallel" bifurcations & the clinical implications for SideB closure are demonstrated. It is postulated that the appearances of the carina secondary to the angle of divergence between the main-branch (MainB) & SideB origins dictates how the SideB will react to the effects of MainB stenting. A more perpendicular take-off of the SideB from the MainB may not be affected by carina shift, whereas a shallower angle of divergence between MainB & SideB origins may potentially expose the SideB to risk of closure. The principle of re-crossing of the coronary wire (after MainB stenting) into the SideB through the most distal cell of the MainB stent covering the SideB opening, & implications of resultant malapposed struts with metallic extension of the carina if not undertaken are demonstrated.



LAD-DIAGONAL parallel bifurcation. Downstream fly-through, (1) aimed at D1 (2) & perpendicular (3) views are illustrated

Conclusion: The potential for the clinical application of 3D frequency domain OCT as a complimentary tool to 2D imaging is demonstrated. A reassessment of the understanding of 2D OCT imaging may be warranted in light of the 3D findings. Real-time, instantaneous, high resolution 3D OCT with quantitative properties are required from industry to validate & apply this technology in conventional PCI practice. This may aid in the further understanding of the complexities of the coronary bifurcation.

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Long-Term Follow-Up of a Large Cohort of Patients with Intermediate Lesions Assessed with IVUS

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Background: The assessment of intermediate lesions can be done with IVUS. However the indication of revascularization based on this strategy and the safety of this approach has been evaluated in small studies without really long-term follow up.
Methods: We have analyzed the clinical outcome of all consecutive pts with intermediate lesions (40-60% stenosis) who underwent IVUS examination in a 4 years period (2004-2007) in our institution. The criteria for revascularization was a minimum lumen area < 4mm2 in vessels >3 mm and < 3.5 mm2 in vessels 2.5-3 mm.
Results: A total of 340 pts were included (408 lesiones studied). After IVUS examination 225 (55%) lesions were left untreated in 185 pts. In this group at 3 years follow up there were 7 deaths (3 cardiac and not lesion related) and 3 infarctions not related with the target lesion. Regarding revascularizations, at 3 years 8 lesions (3.5%) initially evaluated with IVUS in 8 pts (4.3%) required treatment due to progression. In the first year of follow up the incidence of revascularization over target-lesions was 1%. In this follow up 5 pts (2.7%) underwent revascularization of new lesions and 11 pts (6%) over restenotic lesions.
Conclusion: The assessment of intermediate lesions with IVUS indicates revascularization in almost half of lesions. At 3 years follow up the deferred group shows a very low rate of lesion-related events, only revascularization of a 3.5% of lesions.